

internet connection. Perfect implementation fidelity is provided by the website itself. And lastly, maintenance costs are minimal for a programme such as this, once it has been developed. Thus, the overall potential public health value ($R \times E \times A \times I \times M$) is large. However, it must be noted that there often is a very large gap between potential reach and actual reach. The cost to achieve a given reach (and the time required to do so) may well be the impediment in implementing cost effective, efficacious internet interventions. In this study, despite recruitment at very large worksites, the number of enrollees per worksite was low and recruitment was slow, as has been observed in similar studies by others (R Munoz, personal communication, email 2 November 2002). How this affects the representativeness of the sample, and its generalisability, is unclear. Enrolment rates and retention are critical issues that must be addressed in future internet intervention studies.

In sum, the use of a completely automated intervention delivered via the internet resulted in elevated abstinence from cigarettes. This stands in contrast to other self administered interventions, such as self help manuals, which have minimal effectiveness when used alone.^{26 27} Although there are other strategies that might be employed for increasing the quit rates, such as using an online support group with a real moderator, this study indicates that it is possible to provide effective support with an automated system.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the National Cancer Institute for support of this research (grant R44 CA64028).

Authors' affiliations

L H G Swartz, J W Noell, S W Schroeder, D V Ary, Oregon Center for Applied Science, Eugene, Oregon, USA

Competing interests: none declared

Work performed at the Oregon Center for Applied Science, Eugene, Oregon, USA

REFERENCES

- Cassell MM, Jackson C, Cheuvront B. Health communication on the internet: an effective channel for health behavior change? *J Health Commun* 1998;**3**:71–9.
- Etter JF. Using new information technology to treat tobacco dependence. *Respiration* 2002;**69**:7–11.
- Frothingham MJ, Owies D, Leslie E, et al. Interactive health communication in preventive medicine: Internet-based strategies in teaching and research. *Am J Prev Med* 2000;**19**:113–20.
- PriceWaterhouseCoopers. HealthCast 2010: Healthcare on the internet. 2 November 1999. Retrieved 17 April 2003 from <http://www.pwchealth.com/healthcast2010/html>.
- Robinson TN, Patrick K, Eng TR, et al. An evidence-based approach to interactive health communication. *JAMA* 1998;**280**:1264–9.
- Bessell TL, McDonald S, Silagy CA, et al. Do internet interventions for consumers cause more harm than good? A systematic review. *Health Expect* 2002;**5**:28–37.
- Etter JF, Perneger TV. Effectiveness of a computer-tailored smoking cessation program: a randomized trial. *Arch Intern Med* 2001;**161**:2596–601.
- Shiffman S, Paty JA, Rohay JM, et al. The efficacy of computer-tailored smoking cessation material as a supplement to nicotine patch therapy. *Drug Alcohol Depend* 2001;**64**:35–46.
- Takahashi Y, Satomura K, Miyagishima K, et al. A new smoking cessation programme using the internet. *Tobacco Control* 1999;**8**:109–10.
- Strecher VJ. Computer-tailored smoking cessation materials: a review and discussion. *Patient Educ Couns* 1999;**36**:107–17.
- Velicer WF, Prochaska JO, Fava JL, et al. Interactive versus noninteractive interventions and dose-response relationships for stage-matched smoking cessation programs in a managed care setting. *Health Psychol* 1999;**18**:21–8.
- Bandura A. *Principles of behavior modification*. New York: Holt, Rinehart, and Winston, 1969.
- Bandura A. *Self-efficacy: The exercise of control*. New York: Freeman, 1997.
- Piper ME, Fox BJ, Welsch SK, et al. Gender and racial/ethnic differences in tobacco-dependence treatment: a commentary and research recommendations. *Nicotine Tob Res* 2001;**3**:291–7.
- Wetter DW, Fiore MC, Young TB, et al. Gender differences in response to nicotine replacement therapy: objective and subjective indexes of tobacco withdrawal. *Exp Clin Psychopharmacol* 1999;**7**:135–44.
- Abrams DB, Niaura R, Brown RB, et al. *The tobacco dependence treatment handbook: a guide to best practices*. New York: The Guilford Press, 2003.
- Fiore MC, Bailey WC, Cohen SJ, et al. *Treating tobacco use and dependence*. Clinical Practice Guideline. Rockville, Maryland: US Department of Health and Human Services, Public Health Service, June, 2000.
- Hollis JF, Lichtenstein E, Vogt TM, et al. Nurse-assisted counseling for smokers in primary care. *Ann Intern Med* 1993;**118**:521–5.
- Lichtenstein E, Hollis JF, Severson HH, et al. Tobacco cessation interventions in health care settings: rationale, model, outcomes. *Addict Behav* 1996;**21**:709–20.
- Schneider NG, Olmstead R, Mody FV, et al. Efficacy of a nicotine nasal spray in smoking cessation: a placebo-controlled, double-blind trial. *Addiction* 1995;**90**:1671–82.
- Zhu SH, Anderson CM, Tedeschi GJ, et al. Evidence of real-world effectiveness of a telephone quitline for smokers. *N Engl J Med* 2002;**347**:1087–93.
- Society for Nicotine and Tobacco Research, Subcommittee on Biochemical Verification. Biochemical verification of tobacco use and cessation. *Nicotine Tob Res* 2002;**4**:149–59.
- Feil EG, Noell J, Lichtenstein E, et al. Evaluation of an internet-based smoking cessation program: lessons learned from a pilot study. *Nicotine Tob Res* 2003;**5**:1–6.
- Prochaska JO, Velicer WF, Fava JL. Evaluating a population-based recruitment approach and a stage-based expert system intervention for smoking cessation. *Addict Behav* 2001;**26**:583–602.
- Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health* 1999;**89**:322–7.
- Curry SJ, Ludman EJ, McClure J. Self-administered treatment for smoking cessation. *J Clin Psychol* 2003;**59**:305–19.
- Lancaster T, Stead LF. Self-help interventions for smoking cessation (Cochrane Review). In: *The Cochrane Library*, issue 4, 2004. Chichester, UK: John Wiley & Sons, Ltd.

11th European Forum on Quality Improvement in Health Care

26–28 April 2006, Prague, Czech Republic

For further information please go to: www.quality.bmj.com

Book early to benefit from a discounted delegate rate